Abstract

The aim of this thesis is to develop a simplified space vector PWM (SVPWM) method for three level diode clamp inverter and investigate the applications of three level diode clamp inverter for high power ac drives A simplified procedure for the implementation of the SVPWM for three level diode clamp inverter is proposed, in which the complexity of the SVPWM is reduced to that of two level inverter The proposed method is implemented in TMS320F240 based digital controller and experimentally verified on a constant v/f drive

In high power applications, such as voltage fed ac drives, the switching frequency is quite low So the above SVPWM algorithm is modified for low switching frequency applications, by enforcing synchronization, half wave symmetry (HWS) and three phase symmetry (TPS) The conditions to obtain these are derived in terms of inverter states These modified SVPWM sequences are implemented in TMS320F240 based digital controller and verified on a constant open loop v/f drive The experimental harmonic spectra of inverter line voltages of inverter and motor current show the absence of even harmonics and triplen harmonics Also the modified SVPWM sequences have improved *THD* compared to the synchronized SVPWM sequences which do not ensure HWS and TPS It is also shown theoretically and also experimentally that the modified SVPWM sequences ensure balancing of dc bus capacitor voltages for balanced three phase loads

A novel application of three level diode clamp inverter for current fed ac drives is proposed In the proposed configuration, the three level inverter is used as active filter replacing the bulky ac capacitors of the conventional CSI drive Use of an active filter with sufficiently large bandwidth results in near sinusoidal motor voltage and current throughout the speed range Therefore problems encountered in VSI drives such as common mode voltage and voltage spike caused by the reflection of steep wavefronts in long cables are avoided Unlike the conventional CSI drive, the proposed drive has stable operation at low speed ranges In the proposed drive the CSI is switched at fundamental frequency, hence design of gate circuit for CSI is simple Hence the proposed drive is a better alternative to the conventional CSI drives, it can also be retrofitted in existing CSI drive with suitable modifications in the control A vector controlled drive based on the proposed configuration is verified both by simulation and experiment